Claims

1. Piezoelectric component

- having a stack (1) of piezoelectric layers (2) stacked on top of one another and electrode layers (3a, 3b) arranged between them,

- wherein the electrode layers (3a, 3b) have a middle segment (4) in the interior of the stack (1), as well as an end segment (6) delimited by the interior side of a vertical edge zone (5) of the stack (1),

- wherein the end segments (6) of the electrode layers (3a, 4b) are enclosed by a first piezoelectric material (7), whose relative expansion is less than the relative expansion of a second piezoelectric material (9), which is arranged in a middle region (8) between two adjacent electrode layers (3a, 3b).

2. Component according to claim 1,

wherein the relative expansion of the first piezoelectric material (7) comprises no more than 95% of the relative expansion of the second piezoelectric material (9).

3. Component according to claim 2,

wherein the relative expansion of the first piezoelectric material (7) comprises no more than 90% of the relative expansion of the second piezoelectric material (9).

4. Component according to one of claims 1 to 3,

wherein the surface area of an edge zone (6) comprises at least 5% of the surface area of the electrode layer (3a, 3b).

5. Component according to one of claims 1 to 4,

wherein the transition in the relative expansion between the first and second piezoelectric material (7, 9) is constant.

6. Component according to one of claims 1 to 5,

wherein the first piezoelectric material (7) is formed from the second piezoelectric material (9) by diffusing in a doping material originating in the electrode layers (3a, 3b).

7. Component according to claim 6,

wherein the doping material is copper.

8. Component according to claim 6,

wherein the first piezoelectric material (7) is $Pb_{0.97}Zr_{0.56}Ti_{0.46}Nd_{0.02}O_3$, with a copper content of 3-10 mol.%, and the second piezoelectric material (9) is $Pb_{0.97}Zr_{0.56}Ti_{0.46}Nd_{0.02}O_3$, with a copper content of 1-2 mol.%.

9. Component according to one of claims 1 to 5,

- wherein the stack (1) is formed from layers having the layer sequence E-A-B-A-E,

- wherein E stands for an electrode layer (3a, 3b),

- wherein A stands for a ceramic film that contains the first piezoelectric material (7),

- and wherein B stands for a ceramic film that contains the second piezoelectric material (9).

10. Component according to one of claims 1 to 5,

- wherein the stack (1) is formed from layers having the layer sequence E-C-B-C-E,

- wherein E stands for an electrode layer (3a, 3b),

- wherein A stands for a ceramic film that contains the first piezoelectric material (7),

- wherein C stands for a layer formed by two adjacent silk-screened layers (10, 11),

- wherein the first silk-screened layer (10) contains the first piezoelectric material and covers the end segment (6) of the adjacent electrode layer (3a, 3b),

- and wherein the second silk-screened layer (11) contains the second piezoelectric material (9) and covers the middle segment (4) of the adjacent electrode layers (3a, 3b).

11. Component according to claim 10,

wherein the silk-screened layers (10, 11) completely cover the layer B, and each extends to the inner edge of the end segments (6) of the adjacent electrode layer (3a, 3b).

12. Component according to one of claims 1 to 11,

wherein the stack (1) is a monolithic sintered compact.

13. Component according to one of claims 1 to 12,

wherein the electrode layers (3a, 3b) contain copper.

14. Method for the production of a piezoelectric component having a stack (1) of piezoelectric layers (2) stacked on top of one another and electrode layers (3a, 3b) arranged between them, wherein the electrode layers (3a, 3b) are enclosed by a first piezoelectric material (7), whose relative expansion is less than that of a second piezoelectric material (9), which is arranged in the middle region (8) between two adjacent electrode layers (3a, 3b),

wherein production takes place by sintering a stack (1) of green films and electrode layers (3a, 3b) stacked on top of one another, and

wherein the first piezoelectric material (1) is formed from the second piezoelectric material (2) via diffusing in doping materials contained in the electrode layers (3a, 3b) for a period of 4 to 10 hours at a temperature of between 800 and 1500°C, which is reached during sintering of the stack (1).